

AVIATION WEEK

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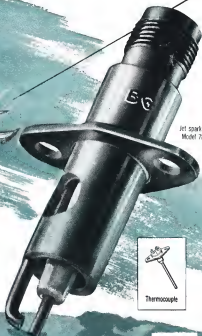
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Number 8

● High, wide and handsome is the intercontinental part of the B-56, its triple landing gear and pusher propellers clearly stem from early aircraft. But there the resemblance ends.

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This portable shelter is made of lightweight panels de-
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NEWS DIGEST

DOMESTIC

Six B-46 bombers landed in England
after one-stop flights from Fort Worth.
Tex. Plans included at Langley AFB,
Va., but each took a different route to
England, completing 7000 mile flight in
about 24 hours flying time. The planes
carried combat loads, dropping practice
bombs en route. It was the last time
B-46s had landed on foreign soil.

NWA 3-03 crashed and burned near
Rendles, Wash., on a flight from Spo-
kane to Seattle, losing all seven passen-
gers and three crew members.
Aircraft scattered for months after
crash.

Jet combat efficiency is highlighted in
combat reports from Korea as the
German Panther came-laid fighter
which ended the plane with having
achieved a record of 96 percent combat
availability in the period up to Decem-
ber, 1950.

McDonnell F2H Banshee operated
by Marine Fighter Squadron VMSF-122
at Cherry Point base has been making
weekly penetration flights of up to
60,000 ft. before landing through the
outpost. Training is to step up all-
weather operating efficiency.

Boeing's new capacity is being built into
North America's T-33 trainer as a
result of comments received from Boeing
regarding the new plane. The company is
also considering acquisition of a re-
vised instrument flying lead.

Ottawa AFB, Ont., has been officially
activated by the 14th Air Force, with
Lt. Col. Charles Decker named command-
ing officer.

Bel 24-35 captives assigned to the
Navy in Korea are cooperating with the
Marine and Army ground forces in
evacuating prisoners.

FINANCIAL

Standard-Thomson Corp., aviation
and automotive parts maker, reports sales
of \$4,945,999 for the six-month period
ended Nov. 30, 1950. Net profits be-
fore taxes were \$904,972, a 24.4 percent
gain over the similar period in 1949.

INTERNATIONAL

De Havilland Aircraft Canada reports a
net profit of \$124,000 in 1950 com-
pared with \$65,114 in 1949.

Hanau-Solna has contracted to pro-
duce in France the Rolls-Royce Ty-
turboprop engines under license.

Our Expanding Industry...

Cleveland Pneumatic Tool Co.
has started a \$2.5-million program
to expand production facilities for
increased output of leading gas
and other aircraft products. Com-
pany is acquiring the financing of
\$1 million of the total, the bal-
ance covering machine tools being
acquired from government. Target
date to complete program: July 15,
1951.

**Ford Instrument Co., Long
Island City, N. Y.**, has received a
multi-million dollar contract to
produce instrument assemblies for
the F-86H HURL, now in
quantity production for the
Navy.

Kaiser-Power Corp. will go after
aircraft wheelbarrow work for a
plant at San Leandro, Calif., that
it has just leased from Osborne
Machinery Co., KF originally an-
nounced to use plant for auto manuf-
acture, but switched plans when the
stepped up aircraft program came
along. Facility now is expected to
start, 1950.

All-American Airways, engineer-
ing and research division, Wil-

mingham, Del., has been awarded
a \$400,000 contract to produce
special watches for military use,
and expects the order to be
increased. The watch's misshapen
design has been developed in part
in development of flight
instruments and other aviation devices
for the Navy.

**Procter Appliance Co., Cleve-
land**, is buying new machinery,
taking over more production space
and establishing subsidiaries to
handle growing device business,
the company's annual sales increas-
ing to \$10 million. Building now a \$6
million Procter has installed ad-
ditional machinery and launched
subcontracting to increase produc-
tion of various fittings and valves at
the Los Angeles plant bought
from Snow Products Co. in
Riverside, Cal. bought machinery for
the Cleveland Value division,
taken back \$10,000 ft. of plant
space leased to Thompson Pro-
ducts, set up in Los Angeles by
Spectra Rubber Products Co. to
catch up on production of syn-
thetic rubber O-rings.



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of faster planes

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Capt. Eddie Radenbacher's recent post-statement in Miami that ENL will move its central offices to Florida baffles other company executives in N.Y. Friends of Harold Jones believe he will escape from GNB before long. Candidates to join K. Northing as the next chief of his mother, Mrs. Helen K. Northing, 58, in Los Angeles.

That special House subcommittee (headed by Rep. John Williams) investigating government personnel practices does not seem expected to look into CIA, GAO or the military; its most recent report criticized "poor office staffing" at Bureau of Labor Statistics & Treasury.

Regardless of what they are seeing now, organic and sustainable markets will be booming thousands of women before long. Pratt & Whitney is a leader in the trend—already it has 2400 women out of 84,000 production workers.

Flight—In Amsterdam, formerly managing editor of *Aviation Digest*, has joined the editorial staff of McGraw-Hill's *Engineering News-Record*.

Jan. 22-25—Winter general meeting, American Institute of Electrical Engineers, Hotel Statler, New York

Jan. 29 Feb. 1-15th annual meeting of the Institute of Aeronautical Sciences, Hotel Astor, N. Y.

Feb. 7-8—Third annual aircraft spraying and dusting short course, University of Minnesota, St. Paul, Minn.

8.—Fynn, Finschide, Finschide, (Halt)
 11.—Widd, Widd, 11.—Droptan, 11, 11—
 11.—Widd, 11.—Korthrup, 11.—Gith, 1,
 11.—



EATO CLIMB TESTED—Ryan L-17 Navajo (above) shows its short-field capabilities among Eato squad for shorter takeoff, while at right the first Fairchild C-119 Pocket Bird with rockets gets off in about 400 ft. Success hinges on on the C-119.



H119 LEAD6 UP—Big Skyline H119 is very tall on the Connecticut National Guard base with steel beams high above standard combat equipment. Entrance is through loading dock with narrow stairs down. Center is covered by 600 lbs. PAW #1190.

A black and white photograph showing a large aircraft assembly plant. Numerous bombers are visible on the assembly line, stretching into the distance. The aircraft are arranged in rows, and the factory floor is filled with various components and equipment. The perspective is from an elevated position, looking down the length of the assembly line.

AF ORDERS 5210218—Limited numbers of Serial 8-44a (FH 24c), have been ordered for covering Christmas Week Jan. 19.



WHO'S WHERE

In the Front Office

Harry Woodford has been named general manager of Douglas Aircraft's integrated Tulsa division which will build the B-47 Stratojet. Woodford, president of Convair during World War II, is a veteran aircraft production expert. He has headed the Western Front Metal Division of Douglas since 1945. In other integrated production moves, the company named its new general manager, Ken Springer for El Segundo. Paul Herman for Long Beach, Leo Guder for North Hollywood.

Ken Haggan, director of public relations of Republic Aviation Corp., has been named assistant to Assistant President Mandy Fink. Sam Shinn, veteran civil law writer recently with International News Service in Washington, is joining Republic's public relations department.

Henry Garwood, treasurer of Bell Aircraft since 1945, has been appointed vice president in charge of all foreigner operations, including engineering, administration, sales and service. The new post will also coordinate the company's capital activities under one head.

Richard D. Murrell has been named vice president/general manager of Pacific Aircraft Corp.'s manufacturing division. He originally came to PAC as a design engineer, serving as chief of design, air control system and manufacturing systems and is credited with developing the Atomic piston-engine system.

R. L. Kinnell has been appointed executive vice president and director of Rhode-Island Co., Dallas Corp. and of general manager. Both are formerly assistant to the president of North American Aviation. James H. Lander has been named vice president/manufacturing. He was formerly sales manager for Mercury.

Donald B. Thorp is now technical assistant to the president of Airborne Instruments Laboratory. He was previously executive assistant to the director of research at Collins Radio.

What They're Doing

Dr. Theodore F. Wright will become acting president of Cornell University on Feb. 1, succeeding Dr. Cornelius W. de Krom, who is being granted a special leave of absence to coordinate a special seminar abroad. Dr. Wright has been the university's vice president for research.

D. G. Kinnell, North American's representative of aircraft engineering, has been named as NACA's group on wing problems, and M. Black Chubb, NACA's group on airframe, has been named a member of the NACA subcommittee on aerodynamics.

INDUSTRY OBSERVER

► No. 2 Douglas A-2D Navy turboprop attack fighter has arrived at Edwards AFB, Victor, Calif., to prepare for continuation of the flight test program interrupted by the crash of the original A-2D prototype. Flight program probably will not be resumed, however, said findings of the accident investigation board are completely analyzed and checked against the second plane.

► Next version of the Douglas AD series, the A-2D attack fighter, will take a large step up in power and become a turboprop plane, powered with Westinghouse's new J-45 engine, in the 10,000-hp thrust class.

► Mass-produced SE 2000 Annapolis helicopter transport, first in a series of H-19s, had flown 30 minutes in its first test flight at Tuscon-Baggage. Plane is powered with four Pratt & Whitney Wasp Major D-560 engines, is modified engineered by Rohr Aircraft Corp. and Pratt & Whitney. The 54 engine and certain propellers and rotor assemblies for the first seven planes have been purchased by ECA at a total cost of \$4.5 million.

► Glenn L. Martin Co., which produces some components of the F-4U C-119 combat transport under subcontract, has been asked to produce the same parts under subcontract to Kaiser-Frazer while the KF Willow Run plant gets rolling on B-26 production.

► Jet helicopter developments are moving fast. Sikorsky and Helios are both engaged experimenting with jet-powered rotor systems in addition to the jet-powered auxiliary, now being tested under USAF contracts by American Helicopter, McDonnell and Hughes Aircraft.

► Shortage of critical materials may give the British-designed T2001B-1B Superjet another boost as far as American orders to Wright Aero-nautical Corp. are concerned. The Superjet is to be built in this country now as critical coils or subcomponents. It has two turbine wheels, axial compressor diameter about 2 ft. long, compressor section about 3 ft. long probably accelerated about 1.5 times. Higher capacity jet flow also located pressure ratio (7.1) is needed for the Superjet's very high performance.

► Several U.S. manufacturers now using GE J-47 and Allison J-35 engines for their fighters and bombers are seriously considering the additional power which the almost unmatchable Superjet engine can give them. The Superjet F-47 fighter is planning to switch to Superjet, the Martin B-51 ground support bomber, now powered by three J-47s, is likely to take the Superjet in an experimental installation when they become available, assuming that Martin finally gets Air Force orders for production of the airplane.

► First decision on the British B-2000 transport's future still waits flight tests on the turboprop-powered B-2000 still under construction and due for flight in 1952. But a British Civil Air Ministry spokesman has indicated that the rapid development of British jet transport types has actually outdistanced the 130-twin plane. There has been no consideration of a production order for additional B-2000s after the first two, it is stated.

► What was probably the first intentional simultaneous landing of a C-47 jet plane and its glider was made recently at Ladd Field, Alaska, by a B-47 D of the 20th Tactical Squadron. The landing was made experimentally to determine if such a procedure could be made operational to prevent landing delays of following aircraft in bad weather. The experiment proved successful and it was further indicated that the glider could be towed off the runway quicker by its tug plane than if it waited for ground tugs.

Washington Roundup

Defense Money

Defense Department's budget for 1952 fiscal year, which starts July 1, will top \$62 billion. This is based on an Administration guess which may be off a few billion dollars more or less. The military hasn't yet released data on its program, computed the estimated cost in detail.

The 1952 outlook is for:
 • An Air Force budget of around \$20 billion, with about \$10 billion for procurement. So far this year, USAF has been given \$17.9 billion, with \$6.6 billion for procurement.
 • A Naval aviation budget exceeding \$5 billion, with \$2.4 billion for aircraft procurement. So far this year, \$1.4 billion has been passed for Naval av.

There will probably be over \$1 billion for the aircraft research and development programs of the two services included in procurement allocation—double the \$300 million they have for that year.

Slow Build-up

Expenditures are lagging far behind appropriations. They are the lagging of military power in being reorganized, industrial capacity, hardware. USAF is now spending at a rate of about \$6 billion a year. This is expected to amount to a rate of \$13 to \$15 billion by the end of 1951.

Third Supplemental

The service will get \$10 billion additional for this year, boosting the 1951 fiscal year total outlay for Defense Department to \$55 billion. The supplemental will cover money for extra aviation activities down the line, procurement, plant, building, industrial mobilization, research and development, increases in military personnel.

The third supplemental for 1951 will probably go to Congress around March, along with the 1952 fiscal year budget. Taming depends on when the military completes its program. It will be quickly delayed by Budget Bureau and Congress. Mobilization will then go into high gear. Expect a big lag of defense contracts, starting late spring.

False Assurances

Congressional rumors for more action on mobilization has rebounded with the service's speed in reorganizing funds over the past few weeks.

There's still skepticism in Congress with the "hush of darkness" policy—keeping up a vast industrial base, but only a nucleus of might in being, from which the U.S. could rapidly spring into all-out mobilization. This, despite warnings of the President and Chairman of the Joint Chiefs of Staff, Gen. Omar Bradley, that there is a plan in all that's needed to meet an emergency. Congress has been the President's warning, also endorsed by Bradley in Truman's budget message a year ago. The \$13 billion which was all that was allowed for 1951 defense was not described by the President like this. (It) "You better get a move going in a high state of training, available for immediate use if necessary and on a scale far beyond responsibility in the event of an emergency."

Congressmen now generally have a "wait and see" attitude. If the industrial situation gets still worse, they will call for a bigger build-up of military strength.

Broadening the Industrial Base

Under the new policy to build up capacity that won't be producing until there's all-out mobilization, Washington will:

- Pursue joint contracting manufacturers to subcontract and sub-inventive to the maximum. Purpose is to liquidate some firms with defense work.
- Try to bring in many outside manufacturers into aircraft production as possible. This, to build up a reserve of contractors with know-how.
- Close building of new plants, even though existing facilities, on building gets going, may not be fully utilized. USAF's contract to Chrysler Corp. to build Pratt & Whitney jet engines is a plant yet to be constructed is the first sign of it.
- Give increasing weight to labor supply in letting contracts. Service want new labor trained for defense work, instead of over-time working of unused laborers.

Here and There

► **Flash deck order.** New \$1,000,000 flash deck, under the Navy is going ahead on an off cost \$235 million, 565 million more than the 60,000-unit United States Price across account largely for the difference. It will be too big to go through the Panama Canal, will have to go around Cape Horn to transfer from Pacific to Atlantic operations. Estimated loss as the completed United States \$20 million.

► **International subsidies.** The plan for accounting service cost pay from subsidy over international is under review. Some states in Europe and Africa will be considered service pay, everything over and above that, is subsidy.

► **Airline loan replacement.** That CAA controls RVC loans to airlines would be eliminated in a new bill by Sen. J. William Fulbright. He feels that when CAA assumes a loan, the Board thereafter is obligated to furnish enough money to pay to get the loan paid off. He means, reversing the much-estimated RVC, would authorize a government with full authority and responsibility over RVC activities to take over from the private business board of directors.

► **Plant training.** CAA, before legislation, authorizing a \$150 million plant training program but is waiting to see if the Air Force will go along along through training. The USAF would prefer to do the job itself, but in its view, if it being demanded to support the nation's training program by direct of publicity of mobilization in its training service program of World War II, assistance to CAA's pre-WWII War II civilian pilot training program.

► **Service loan.** Shipping companies, after a period of time of contract, are again going for service over their codes. Rep. Eugene Keough's bill would open the way for them to enter the air business.

► **Moving CAA.** CAA is moved down for national, in the bill of Washington, is a plan for decentralization of the federal government. It will be subject to change by Budget Bureau and National Security Resources Board.

Naval Aviation Orders Reach \$1.4 Billion

Nine airframe, five
copter, five engine
firms included.

By Alexander McSweeney

Navy's 1951 aviation procurement is rolling in high gear, with principal aircraft orders spreading out among 15 manufacturers.

A status report from Navy's Bureau of Aeronautics for Aviation Week shows that the Navy has now committed \$1.3 billion of a total of \$1.4 billion approved (including five second supplemental appropriations for Navy's "base funds," as of Jan. 12).

(This Navy report, plus the story on Air Force procurement on the Jan. 15 issue of Aviation Week, gives a complete report on 1951 military aircraft expenditures to security permits. As of Jan. 5, USAF had put out \$4.6 billion in orders among eight airframe, four engine and two propeller companies. Virtually all of USAF's \$4.6 billion in expenditures had been awarded.)

The picture for Navy aircraft shows that a total of \$1.06 billion available for aircraft, including new planes, older plane parts, and experimental craft, \$1.4 billion in total.

Second largest share to the Navy aviation buying list, electronics, is not being purchased quite so rapidly. But Navy has already committed over \$700 million for aviation electronic orders and has allocated over \$100 million for additional orders.

Considering that the Navy has only recently received authorization from Congress on the last installment of its aviation buying program for the second supplemental to the 1951 budget (in January, the bulk of funds already committed by Butler ended up either completely unused for later Admiral A. M. Fiske, head of Navy air procurement).

► **Firm Progress**—Nine without major factors are in the Navy 1951 program, to supply the following aircraft:

► **Aviation Aircraft Engineering Corp.**, F4U and F4U lighters, and AF-26 and AF-27 amphibious planes.

► **Douglas Aircraft Co.**, F7D lighters, AD-4, AD-4N, AD-4 and AD-4B attack planes, R4D and R4D-1 transports.

► **McDonnell Aircraft Corp.**, F2H fighters.

► **Lockheed Aircraft Corp.**, F2V-5 and

Navy Air Procurement Status

Funds committed and obligated by the Navy Bureau of Aeronautics for 1951 fiscal year expenditures for Naval aviation are shown in the following table prepared especially for Aviation Week (figures as of Jan. 12)

MAJOR CATEGORY	APPROPRIATED	COMMITTED	OBLIGATED
Construction of aircraft and related procurement	\$2,534,700,000	\$1,555,010,000	\$1,336,424,000
Aircraft and facilities	467,700,000	262,179,000	126,431,000
Total	\$3,002,400,000	\$1,817,189,000	\$1,462,855,000

► **Delays anticipated** include base, first and second supplemental appropriations.

► **Delays committed** are funds assigned to a specific procurement.

► **Delays obligated** are funds for which contracts have been issued.

► **Construction of aircraft and related procurement** refers to new 1951 procurements for complete aircraft and related equipment.

► **Aircraft and facilities** refers to procurement of additional new (plus) for aircraft purchased under prior year's budgets, plus expenditures for maintenance, operations, research and development.

F2V-5 patrol planes, PO-2W solar

warning planes, T-22 jet fighter trans-

ports, and F2V-1 transports.

► **North American Aviation**, AJ-1 attack

loaders, and possibly F1H fighters.

► **Chrysler Vought division**, United Aircraft, F7U-3 fighters.

► **Glebe E. Wright Co.**, P5M-1 flying

boat and P5M-1 fighters.

► **Consolidated Vultee Aircraft Corp.**, R3Y-3 flying boat.

► **Fairchild Aircraft Corp.**, R4Q transport.

Five helicopter companies are dividing the Navy's helicopter contracts for 1951, with Sikorsky, Piasecki and Bell the leaders. Models include Sikorsky HO4S and HO4B, Piasecki HUP, Bell HPT, and Bell HPT, Bell HPT and Bell HPT.

Goodman Aircraft Corp., the only U. S. lighter-than-air manufacturer, has a substantial 1951 Navy contract to supply ZP-1 Minis.

Several engine companies supply powerplants for Navy planes in 1951 contracts.

► **Pitt & Whitney Aircraft**, R-2500 and R-4100 piston engines, and J-42 and J-46 jet engines, and T-34 turboprops.

► **Albion division**, General Motors, F-33

jet engines and T-40 turboprop.

► **Westinghouse Electric Corp.**, F-34

and possibly J-46 jet engines.

► **General Electric**, J-47 jet engines.

► **Curtis-Wright Corp.**, R-336 piston

engines and possibly T-34 turboprops.

Hawthorne Standard Division, United Aircraft Corp., is believed to be the largest Navy propeller contractor, with Aviatopco division of General Motors Corp., and Curtis-Wright Corp. sharing remaining propeller business.

Tied toward large procurement expenditures for electronic, electric and

radio equipment for USAF planes, included in the Aviation Week Jan. 15 story about Air Force procurement, is

most apparent in the Navy procurement. Principal contractors include Sperry,

Lock, Bendix Aviation, Raytheon, RCA, Collins Radio, General Electric, and Minneapolis-Honeywell.



ONE ARRANGEMENT of bigger C-124 would carry combat vehicle plus gun. Big plane brings air transportable army units.

Douglas Building Turboprop C-124

P&W YT-34 5500-hp. engines will permit 25,000-lb. gross weight increase and greater range or payload.

By Rex S. Lee

Air Force has specified that it is moving definitely and heavily into turboprop powerplants. The sign was the award to Douglas Aircraft Co. of a development contract for a turboprop version of the C-124 Globemaster II.

Already under construction at Douglas Long Beach, Calif., plant, the new heavy transport has been designated YC-124B.

The big craft will be powered by four Pratt & Whitney YT-34-P4 engines rated at 5500 hp each. Engines will drive three-shafted, Constant 18 ft props. It is the first Air Force major engine turboprop plane.

► **Turboprop Development**—Decision on the part of the Air Force to contract for a turboprop-powered C-124 has given rise in Washington to further speculation that USAF has also decided to go ahead with a turboprop version of the giant B-36 USAF's Senior Officers Board has been considering proposals by both Boeing and Consolidated Vultee

for a successor to the B-36 incorporating engine bombs.

Ultimate decision is favor of the turboprop engine Boeing XB-52 contender or in favor of the turboprop engine version of the Boeing B-36 is expected to end the discussion in favor of the latter.

The turbocharging engine Glebe under C-124B is presently powered by four Pratt & Whitney R-4360s rated at 1500 hp each. In its present configuration form, with a design gross weight of 175,000 lb., the C-124 can transport a payload of 70,000 lb. 150 on a single-engine basis for remote field and return to base without refueling. Both payload and range, however, may be varied by operating at alternate gross weight of the big plane.

► **Design Design**—Glebe's substitution of more powerful turboprop engines for present powerplants will make it possible to increase design gross weight to 200,000 lb. The new engine will increase appreciably the payload and/or range of the B-36 version over the

A version. Another advantage gained is a sharp decrease in runway footage required for takeoff. These results hoped for by USAF is an appreciable reduction in overall operating costs.

Heavy transports, in the C-124B series, have been given renewed analysis by both Army and Air Force in rapid mobility of armed forces because mandatory in present global military thinking.

► **Air-Transportable Army**—Utilization of transports is big in the C-124B and the proposed YC-124B bring Army's desire of an all air transportable army near realization. Studies indicate that a fleet of 80 C-124B transports could, in one cross flight, transport all personnel of an airborne division from the United States to nearly any point of potential conflict with but two refueling stops. Some of the study was a cost estimate of 16,000 troops with a combat equipment loadout of 240 lb. per man.

One of the most interesting studies built around the C-124 is use of the transport at altitudes weights less than the design weight. For example, one study showed in the establishment of an island, a 12,000 lb. loadout could be moved by the transport from a sea

be moved by the transport from a rear base to a forward base with a 2100-ft. landing strip.

The study pointed out that the plane, with a 147,000-lb. gross wt., would take off from the rear base, over a 50-ft. obstacle in 1250 ft. Landing weight at the advanced base would be about 118,000 lb. Landing distance over a 50-ft. obstacle using the plane's available range would be 2050 ft. Actual ground roll with the single backpack load is estimated at 970 ft. Third landing ground run for the return trip is estimated at 1350 ft.

More significantly, because of the longer takeoff rolls sought and the C-124's large landing wheels, ground pressure at the pressure of the C-124 may be reduced to 34 psi by installing a 42 percent fuel deflection. Ground pressure therefore is below that of a C-124 (45 psi).

Complete details of types of cargo which can be carried by the C-124A leads into evidence to the thinking behind USAF's move into the very heavy multi-engine transport field.

The C-124A can transport accommodations for 200, with 312 on the main floor and 98 on the main floor. Two passenger doors have been incorporated into the present configuration. In addition, the air loading will be able to handle air drops. This enables the big craft easily to transport aircraft drop missions.

In carrying general Air Force cargo the C-124A shows up well. Studies indicate that particularly one type of cargo for any USAF aircraft is easily handled. The plane can load rock stoves as completely crated aircraft engines, rifle assemblies 14½ ft. deep, 8-16 ft. wide and enter very high places, or enter, but perhaps disassemble the engines, helicopters or liaison aircraft.

► **Task Center**—The plane can also transport all varieties of motorized vehicles. More than 90 percent of all military vehicles can be air transported without disassembly. The transport load capacity was designed to accommodate the largest vehicle permitted on U. S. highways. The entry door was made large enough to load the widest, and longest loads. After these dimensions were established, Army Command Finck presented that the width be increased another 5 in., so that the plane could load its own light tank then under development. Now standard is 135 in. wide and 140 in. high, and the cargo compartment has a volume of 10,400 cu. ft.

Wing type of the C-124A is 173 ft. 3 in., length, 137 ft. 6 in., height. The main cabin door is 45 ft. 3 in. The cargo compartment configuration will retain flexibility to make dimensional alterations modifications to accommodate the new proposals will be incorporated.

used as well as many new designs being used to increase flight efficiency.

One interesting new feature is that the new aircraft will be equipped with wingtip bombing units for forward deployment of the leading edge of both wings. Use of this system makes it unnecessary to "blast" land—and therefore horsepower—from the engine into position for wing dropping.

Additional feature is the responsiveness to a potential ground operation at higher and more economical altitudes. Present service ceiling is 20,000 ft.

CAA Spending Will Decline

Civil Aviation Administration is due for retrenchment during the next few years, as major federal spending is channeled into defense activities.

The \$505 million the President asked for the agency in the 1952 fiscal year budget is \$26 million below the \$521 million CAA has for the current fiscal year. Congress will probably trim the request further. The continuing on civilian projects will let airport construction hardest, most in a lean budget in construction on airport facilities.

A slight increase was recommended for Civil Aeronautics Board to keep its work up to date. The \$34 million proposed for the 1952 fiscal year compares with the \$35 million CAA has for the year.

CAA's budget for 1952 fiscal year includes:

- **Salaries and expenses**, \$104 million, compared with \$97.5 million last year. The increase is due to the need for personnel for new facilities coming into operation and to take care of salary increases.
- **Establishment of navigation facilities**, \$15.4 million, compared with \$20 million this year. Of this, \$17 million is for implementation of Radio Technical Commission for Aeronautics' "beacon" system to assist precision approach and instrument entry, instrument landing systems, distance measuring equipment and cross-directional radio range on the airways. The sum of \$7.8 million is for improvement of existing facilities.
- **Air navigation development**, \$8 million, compared with \$6.2 million this year. Activity on this long-range program, looking to all weather flying by 1970, will be limited to flight training and maintenance of prototypes already developed.
- **Airport construction**, \$35.4 million, compared with \$71 million this year. Of this, \$15.5 million will go toward construction of 146 small airports, and \$4.5 million is earmarked for locations considered for future service which cannot now receive it because of lack of facilities.
- **Technical development**, \$1.1 million, the same as this year.



THUNDERBOLTS IN KOREA—They have arrived, both bullets and bombers.

Korean Combat Report on F-4E

Republic of Korea's operating in Korea since Dec. 7 have piled up an impressive combat and maintenance record under far from ideal conditions, proving again the reliability of U. S.-built jets.

First on the spot reports from Republic Air Force said representatives Arthur Brown and Bob Bennett in the combat zone point up that the job of providing aerial support to the United Nations may pay off poorly in headlines but wins credibility from the troops and men who have to fly and service the planes.

The 27th Fighter-Bomber Wing is operating the F-4Es. They have flown 736 combat sorties in one mission by one pilot and another 1400 with total combat time of over 1400 hr., not counting test flights or ferrying.

► **Heavy Load**—The heavy Thunderbolt carries a heavy load into combat. One F-4E has carried two 500-lb. bombs, 1800 rounds of 30-cal. ammunition and fully loaded wingtip fuel tanks.

The 27th has been pounding enemy gun positions, tanks, bridges, tunnels, rail tracks, bunkers, truck convoys and every target. The persistence with the ground has left the plane little or no time to go MACH 1.5 loading.

Like its World War I fighter-bomber predecessor, the modern F-4E Thunderbolt, the Thunderbolt has been making up some impressive examples of ruggedness. One F-4E pilot made a loop, hot landing at a forward air station, plowing through a pile of sacks at the end of the runway. But no damage was done to the landing gear, and the plane was flown "home" following replacement of a damaged dive brake door.

► **Primitive Conditions**—The planes are

parked out on mud strips, frozen in winter at night, get bogged down in low-level and low-altitude for positive viewing conditions. Lack of essential servicing equipment in the early days, for instance, forced the men to use empty ammunition cans for carrying oil. It was not unusual to find water all day. Still the planes went out and did their job.

The Thunderbolts have been "blooded" in combat and have shown that they can take it as well as pass it on. One pilot came back unaware that he had been damaged until he looked his plane over. General Lee had put a four inch hole in the tail section, and there were other holes in the fuselage skin, damaged and engine damage. The pilot reported completely neutral operation. Other battle can have been sustained by wings, fuselage, fuel cells and wingtip tanks, but up to Dec. 26th, the USAF reported no F-4E losses due to enemy action.

Graham to Operate AF Training School

Graham Aviation Co., Bufile, Tex., traces of approximately \$300 million credits for the AAF and 1000 additional technicians in World War II, was named winner of the bidding competition to operate a USAF basic pilot training school at Greenville AFB.

Meanwhile bidding was closed last week at AF Materiel Command and quarters, Dayton, O., for a similar competition to operate a training school at Columbus AFB, Miss. Competition for a third USAF flight school operation by a civilian flight training organization, is expected shortly.

William Graham, head of Graham Aviation, has been operating a flight base operation and flight training organization since 1929, and at one time had a chain of several flight base operations in Pennsylvania. Plans call for his civilian instructor to take a 6-month course at Chase Field, Tex., and then to open the first class in graduate instruction at Greenville, Mar. 5. The first class will include 134 cadets. His contract runs until May 31, 1953.

Training planes will be C-47s, North American T-6 type, which were closed to advanced training in World War II, but are now used for first flight instruction. The current basic course is a combination of the old primary and basic flight training course of World War II days.

Present plans call for each of the first two schools opened to train 450 cadets, and for the third school to train a like number in its first year of operation. Plans for additional flight schools beyond the first three have not yet been formulated, but are being developed now for future use as needed. At the peak of World War II civilian training operations in the USAF were being conducted by the AAF.

Military Production Reports Stopped

In the first definite move since the Korean crisis to restrict information on U. S. military activity, production, the Department of Defense has ordered that the release of monthly military production and equipment procurement production figures by the Census Bureau.

It is probable at this time that military figures in Census quarterly looking reports also will be classified.

The monthly reports, M42A, cover dimensions of military activities by weight, value and dollar value, military equipment by weight, value and dollar value, and military equipment by horsepower, weight and value, and employment in military and marine plants.

The quarterly reports, M42D, have included dollar figures on sales and backlog for both military and civil airplanes, engines and propellers. This report may be suppressed entirely. It is likely that the monthly report will continue to be issued, but in revised form and include only civil equipment. It was not discontinued last week whether the employment figures would still be released.

The M42A reports have been issued through the Defense Dept. and the M42D through the second quarter of 1950. Whether there will be reports in other categories for the remainder of this year is unclear.

These reports have been the sole



AIR IDENTIFICATION MAP

Boundary of the air defense identification zone used by CNA Administrator Donald Ryan for all planes flying in the continental U. S. or its vicinity are shown in the map. Plans are in progress to use the flight plan before entering the air defense zone or before crossing the Canadian boundary out of Washington. A year's experience and more up

to 100,000 air vehicles possible. The new requirement means neither jet nor propeller planes flying in the defense zone, the ground line, planes may operate at less than 4000 ft., above the immediate terrain without reporting position, but for any other type of flying two-way radio will be a prerequisite.

authoritative public index of the state of the aircraft industry. The Defense Department's intention is so tight that the Census Bureau no longer will be permitted to compile the information, at least alone it.

Step-up Is Due for NACA Program

The National Advisory Committee for Aeronautics program will be stepped up next year to better U. S. military aircraft.

The \$98 million requested in the 1952 fiscal year budget for NACA tops the record \$74 million NACA has this year.

- The \$86 million for salaries and expenses is estimated \$28 million for government research, \$18 million for proprietary research, \$50 million for aircraft structural research, \$17 million for operations problems research, and \$11 million for operations of head quarters in Washington.

- The \$29 million for construction is allocated for facilities at these locations: Langley Aeronautical Laboratory, \$5 million for modification of wind tunnels and to complete a facility for testing air naturally; Wallops Island Flight Research Station, \$10,000 for service facilities; Edwards Air High Speed Flight Research Station, \$2.5 million for permanent operating facilities; Ames Aeronautical Laboratory, \$1.5 million for modification of wind tunnels and high speed air jet; Lewis Flight Propulsion Laboratory, \$1.5 million for facilities for research on unconventional fuels and utility systems.

DOs Available for MRO Supplies

National Production Authority Administrator W. H. Harrison has let the state DO priorities extendable in the interest of maintenance repair and operations supplies (MRO supplies), such as drill bits, dies, pins, fasteners and equipment like a wrench set, is specifically excluded from DO priority in the NPA order, Amendment 3 to Regulations 1, Section 11.5 (A).

The Defense Order producer may order the supply at a price with DO priority if he would not make scheduled delivery of the item without the supply.

Capital items get DO priority only through DO-98 or DO-31. In DO-98, the producer gets to the element and gets specific permission for DO on capital equipment up to a certain value. DO-31 applies to items of capital equipment being purchased for the government, which will take title as government.



STRIKERS MEET about on at Fairchild's Bagtown, Md., plant gate.

Fairchild Strike in Third Week

Strike of employees at Fairchild Engine & Airplane Co., Hagerstown, Md., moved into its third week last Wednesday with little indication from management or employees that a pact of mutual agreement was near. U. S. Commissioner Kerner ordered a continuance of company and labor heads of the strike-bound plant on that day, but neither side

called for a meeting that there would be concern on either side. UAW-CIO strikers at the plant were asking for a flat \$15 cents an hour increase. Fairchild management offer is a flat raise of 12 cents per hour to all production employees. Plus an additional 5 cents an hour increase to lead men of production and maintenance groups.

There are 250 men on the runway. Other strikers had headed just prior to the walk.

O'Donnell Returns to Lead 15th Air Force

Major Gen. Emmett "Boss" O'Donnell has been ordered to assume command of the 15th Air Force at March AFB, Riverside, Calif.

O'Donnell, an outposts proposal at strategic air headquarters, is leaving command of the Far East Air Forces' bomber command to expand the 17th AF under current USAF expansion program, an Air Force spokesman said.

But military observers in Washington and in Tokyo believe the new assignment was dictated in part by growing criticism both in the theater and at the Pentagon over role and mission in the employment of air power in the present Korean conflict.

Of the employment of strategic air power in Korea, Gen. O'Donnell and Chief of Staff Gen. H. H. "Veto" Taylor "We simply have not been able to do the job we are extremely capable of doing... It is ridiculous to sit down and blame us for mistakes in Korea."

Employment Is Up, Supply Down

Spot shortages of skilled manpower bring recruiting drives, training programs, longer workweek.

Aircraft employment continues upward in a tight labor market, but the use of men and women in the various aircraft centers. Shortage of skilled workers, hindering aircraft expansion, has stepped up recruiting in outside areas. Plants are still slow to hire women.

That is how the U. S. Employment Service sees the aircraft labor situation in the latest USES bi-monthly survey of 152 industrial areas for November.

Reports to USES show:

- Aircraft employment opening, began last summer, continued in October and November. Some new jobs were sought from 15 to 20 percent.
- Defense sales produced sizable openings in aircraft centers like Wichita, Los Angeles and San Diego.
- Employment expansion was not so strong. Fort Worth added twice as many workers as it did in previous months. Seattle and San Diego reported sizable gains.
- Shortages of skilled workers are still troublesome. At Hartford, lack of housing has slowed down the migration of workers into the area and recruiting outside the area.

The industry has absorbed virtually all available skilled and semi-skilled craft workers in Wichita, Dallas, Fort Worth, Corpus Christi, Los Angeles, San Diego and Seattle.

At Los Angeles, aircraft plants largely used the workweek as some departments to compensate for lack of needed skills.

Training programs have been started in Los Angeles and San Diego. At San Diego, a community employment council is at work trying to eliminate the shortage of skilled and semi-skilled aircraft workers.

Despite the tightening situation, draft-eligible men are not being held, for women are being hired to take men's jobs and leaving of manpower growth, handicapped and inexperienced workers is slow and spotty.

Here is a USES rundown of the situation in aircraft centers in November:

- Baltimore. Aircraft employment up. Except in skilled jobs, labor supply adequate for sizable expansion in aircraft.
- Boston. Moderate labor supply. Some skilled occupations short.
- Bridgeport, Conn. Skilled labor supply. Skilled labor shortage continues. Aircraft employment in the doldrums.



CHECKING THE SCORPION'S POWER.

Right attachment to Boeing F-4B from power Allison J33 pump plant propelsly deployed in the above view, which points up the novel "wing-out" ventilation, a distinct maintenance aid. Covering are quickly re-

movable, and the location of the engine permits good level handling. A built-in pump, actuated by the F-4's hand hydraulic pump, provides the power for actuating the engine to operating position.

- Buffalo. Skilled labor supply. A few seasonal shortages. Hiring specifications generally high.

- Chicago. Tight labor supply. Many seasonal shortages. Supply expanded. Defense work not yet expanded.

- Cleveland. Skilled labor supply. Work hours long. Skilled labor supply maintained in line of expanding labor supply.

- Columbus, O. Skilled labor supply. No critical manpower shortages.

- Dallas. Labor supply tight. Shift of workers from auto and construction work will not satisfy aircraft demand. Heavy in expansion, auto-construction of workers.

- Dayton. Tight labor supply. Spot seasonal shortages for selected jobs, some cuts in workweek. Inexpensive up slowly due to expansion of auto industry.

- Detroit. Labor supply tight. Few defense orders yet. Some defense and short work weeks due to contract shortages.

- Fort Worth. Aircraft employment up. Skilled labor supply of aircraft workers being recruited outside of city despite tight overall labor supply.

- Hartford. Aircraft supply employment poor. Labor supply tight. Skilled workers scarce. Out-of-state recruitment hampered by housing shortage.

- Kansas City. Labor supply tight. Skilled shortages acute.

- Los Angeles. Labor supply tight, tightening. Long employment in a aircraft, machine, machinery, maintenance, long specifications, skilled, but limited hiring of women. Skilled workers shortages caused by longer hours. Materials tightening.

- New Haven. Skilled labor supply. Increased hiring of women expected in supply of new industrial workers diminishes.

- New York. Moderate labor supply. Growing shortage at materials and skilled metal workers.

- Philadelphia. Skilled labor supply. Aircraft expansion anticipated. Recruiting outside the area began.

- St. Louis. Employment at several local airports tight. Labor supply. Considerable in expansion of workers.

- San Diego. Skilled labor supply, but few defense orders. Hiring in aircraft, ship work, government. Labor supply (including women) tightening. High defense demands will stretch supply, skilled, full duty and women workers. Aircraft short despite expanding and planned training.

- Seattle. Skilled labor supply. Employment dip despite tight aircraft hiring. Due to seasonal losses in other industries. Skilled shortage hinder aircraft expansion.

- Wichita. Reduced labor supply. Aircraft expansion drives workers from outside area. Expansion of women employment. Workweeks curiously short. Out-of-state skilled workers needed for aircraft expansion.

PRODUCTION

AF Places Big Zero Reader Order

A tangible result of the breaking of the log jam on Air Force procurement (Aircraft Week Jan. 17) is the \$11,045,681 worth of negotiated contracts in excess of \$25,000 that was signed in the week ending Jan. 5.

Contracts in that category formerly had been hanging between \$3 million and \$4 million weekly.

In the new listing, Sperry Gyroscope Co., Great Neck, N. Y., is the largest contractor, with orders amounting to more than \$6 million for "flight computer systems," which actually are Zero Readers. The Zero Reader, designed by the Air Force as the "A-1 Flight Computer," has now been made a standard item produced by the de Matreux Command. Previous Reader orders were from aircraft manufacturers and were placed in contractor furnished equipment.

Electronic manufacturers got the bulk of the business during the week with Reader, Minneapolis-Honeywell, Fluke and Link all getting contracts in excess of \$1 million.

Largest contract for aircraft during the period went to Douglas—\$13,440,000 for airplanes of an unspecified type.

Listing of negotiated contracts in excess of \$25,000 for the week ending Jan. 5 follows:

Aero Metrol Div. Inc., Los Angeles, Calif. CI 16A, \$15,111.

Aerovision Corp., Jackson, Mich. Hydraulic fittings for aircraft. CI 04A, \$40,314.

Alcoran Electronics Mfg. Co., Inc., Boston, N. Y., aircraft instruments. CI 04A, \$15,116.

Ames Research Mfg. Co., San Francisco, Calif. Los Angeles, miscellaneous space parts and assemblies and sub-assemblies. CI 01F, \$45,348.

Armory Tooling Ward Corp., Rockford, Ill., aircraft steel sheet. CI 13A, \$16,044.

Armstrong Co. of America, Washington, miscellaneous low speed castings. CI 01A, \$14,181.

Barton Calsonic Co., Rockford, Ill., electronic low speed castings and electronic assemblies. CI 01C, \$61,161.

Bentley Steel Tool Mfg. Co., Rockford, N.Y., rigid type bands for bars. CI 48, \$176,181.

Bentley Steel Tool Mfg. Co., Rockford, N.Y., \$10,000 for bands. CI 48, \$176,181.

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Consolidated Victor Aircraft Corp., Ft. Worth, repair, repair and modification of GPF for modification airplanes. CI 01B, \$10,000.

DeLong Corp., Inc., Los Angeles, Dallas and Los Angeles, high temperature stainless steel parts. CI 04A, \$11,571.

Dougherty Aircraft Co., Inc., Santa Monica, Calif., airplanes. CI 01B, \$14,000.

Edwards Kollsman Co., Rockford, N. Y., instruments and equipment. \$415,000.

Federal Motor Vehicle Co., Detroit, space parts for truck trailers. CI 14C, \$24,534.

Gardner Corp., New York, wash, wash, wash, wash. CI 10A, \$16,161.

General Electric Co., Schenectady, position indicator. CI 05C, \$41,311.

Gillette Industries, Inc., Los Angeles, components of solar cell. CI 10C, \$174,081.

Goodman Corp., Rockford, N. Y., aircraft, aircraft assemblies. CI 01B, \$16,700.

Goodman Aircraft Corp., Alton, flight, two bands style. CI 20E, \$207,120.

Great Lakes Mfg. Corp., Muskegon, Ind., Plexiglas windows for aircraft. CI 01F, \$70,000.

Radio Hitt Woodworking Machine Co., Chicago, machine, single spindle and dual. CI 17A, \$40,000.

Remington Engineering Corp., El Segundo, Calif., nose strut assemblies. CI 09C, \$102,000.

Rock & Hunter Precision Industries, Inc., Cleveland, machine and adapters. CI 09C, \$112,781.

Rockwell International Corp., El Segundo, Calif., nose strut assemblies. CI 09C, \$112,781.

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Ignition Headquarters



for Over a Quarter of a Century

Since aviation's earliest days Bendix has dedicated its resources and manufacturing skills to the solution of the industry's ever changing ignition problems. Thus today, one source and one source alone—Bendix—is uniquely qualified to plan and produce ignition equipment specifically designed to meet the operating needs for every plane and purpose.

NLRB Decision on Douglas Planners

Although they are outnumbered 40 to 1 by producers and maintenance employees, production planners at Douglas Aircraft's Long Beach plant must remain part of the overall plant bargaining unit in which they were lumped in November 1945, by an agreement between Douglas and the CIO United Automobile Workers.

The 138 production planners had not been part of the group represented by the CIO union since 1949, and a petition to require the negotiation was filed with the National Labor Relations Board by a group of them.

In a split decision, NLRB rejected the plea.

Bendix

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AERONAUTICAL ENGINEERING

1000 Horses to Start High-Thrust Jets

Short duration starts for new turbojets will demand powers which once were engine designers' goal.

Present trends indicate that starts rated at more than 1000 hp. will be used as takeoff engines of the new fighters. This is the startling observation of William D. Downs of the Air Materiel Command's powerplant laboratory. He accorded this statement by pointing out that less than 25 years ago, 1000 hp. was the objective of aircraft engine development.

Downs presented these and the following views in "Starts for Turbojet Engines," a paper presented recently at the annual meeting of the Society of Automotive Engineers, in Detroit.

Our largest reciprocating engine, the 1900 hp. R-4360, requires only a 5 hp starter. The reason for this disparity of starting power requirements is the reciprocating engine requires starting assistance to only 3 or 5 percent of its rated speed, whereas ignition is not initiated and the engine will develop sufficient power for satisfactory acceleration. But turbojet engines require assistance of a starter to 25 percent (or more) of rated speed. Since power is a function of speed and torque, the high speed cranking is the reason for the high starter power required by gas turbines.

► **Drag Data**—The drag and torque data of a typical turbojet engine (Fig. 1) illustrates the starting characteristic of a gas turbine engine. As you can look more drag (indicated below the chart) is associated. Or engines tested by Downs, benching drag has been smaller than the peak running drag.

At low speed the engine drag is low, increasing at speed increases in a fashion typical of a blower. The relation of drag shown are for normal temperatures.

At -55 F., the increased density of charge will increase the drag by about 35 percent. A much greater increase may be caused by mechanical friction. In one small-flow turbine tested at AMCI's powerplant laboratory, low speed drag at -55 F. was double the normal drag.

► **Temperatures**—At about 600 rpm., ignition may be initiated, the energy added to the air by the combustion reduces the drag. In the vicinity of 500 to 900 rpm., drag reduces to zero and the engine has reached a self-sustaining speed. Above this speed, engine torque becomes available and is used for acceleration.

However, the torque available is not adequate for satisfactory acceleration until the engine reaches the starter cut-out speed, 1600 rpm., or slightly in excess of 25 percent of maximum cruise speed (7700 rpm.). Rated thrust of this engine is 5000 lb.

► **Electrical Power**—This engine uses an electrical starter, with torque characteristics approximately as shown. Current and torque are held very nearly constant from stall to 900 rpm engine rotor speed by varying the voltage to the starter. The torque at an electrical starter using a constant voltage source would normally peak at stall and decrease with increasing speed. Assuming ignition at 600 rpm., this starter will accelerate the engine to 1500 rpm. in approximately 75 sec. Peak power developed is 14 hp.

A constant torque device which delivers 85 lb-ft of torque, 18.5 hp at 920 rpm., is required to provide the same duration of start. The torque is not fully descriptive of the capabilities of the unit. The shape of the curve of starter torque vs. speed must also be considered in judging the performance of a given starter as related to its effective horsepower of that start.

The starting data just considered were determined from deceleration and acceleration runs on the engine. The relation used to derive the data is $T = (P/32.2) \times 60/2500$ (AN-35), where T is torque in lb.-ft., P is power in horsepower and n is engine rotor speed in rpm, and t is time in seconds.

► **Temperature Rise Effect**—Fig. 2 shows data of deceleration and acceleration runs from which data of Fig. 1 for drag and engine torque were calculated. During the deceleration run, fuel was cut off so that there was no combustion. During the acceleration run, the gas temperature in the turbine was maintained at a constant value of 1275 F.

It may be noted that the time to accelerate from 3000 to 3600 rpm. may be reduced by approximately 50 percent by increasing the turbine temperature 300 F.



Fig. 1. Drag and torque data shown for a 5000-lb thrust engine



Fig. 2. Deceleration and acceleration data for 5000-lb thrust engine

► **Pressure Ratio Boost**—The compressing engine went through the increase of being supercharged, not long after it became necessary. It is similar to the turbine gas turbine engine, which is rated at 5000 lb. thrust, an increase in pressure ratio from 4.5:1 to 7.4:1 will be accompanied by an increase in thrust to approximately 9200 lb., and a decrease in fuel consumption from 1.15 to less than 0.9 lb. per hp. lb. of thrust.

The redesign will be accomplished by an increase of compressor temperature rise from 125 to 400 F. at design speed and 60 F. inlet air temperature. This increase in temperature rise will necessitate building a greater portion of the compressor using steel rather than aluminum.

► **Increased Air Flow**—This together with the increase of compressor and turbine speeds will increase the amount of thrust of the engine rotor. The increase in engine thrust will be brought about by an increase in pressure ratio and by flow through the engine.

At design speed the air flow is increased by approximately 20 percent by increasing the air flow and pressure ratio.



Fig. 3. Estimated power required to start 5000- and 9200-lb thrust engines

increase the engine rotor drag during starting.

► **Idle Speed Upset**—Another effect of the redesign is a more rapid dissipation of compressor efficiency as speed is decreased. Evidence of this effect is an increase in engine idling speed.

Whereas the engine which delivered 5000 lb. thrust idled at about 27 percent of rated speed, engine turbochargers have estimated that an engine such as the 9200 lb. thrust engine may have an idling speed as high as 50 percent of rated engine speed. Hence, we must expect a considerable increase in the starting displacement speed.

► **5000 vs. 9000**—Increase in engine rotor moment of inertia, engine drag and starter displacement speed will increase the power required to start the large pressure ratio engine. Fig. 3 presents curves of estimated torque required versus starting time for the 5000-lb. and the 9200-lb. thrust engines.

The curves show that the 9200-lb. thrust engine will require approximately 60 hp for a 25-sec. start and approximately 400 hp for a 5-sec. start. The 5000-lb. thrust engine will require approximately 180 hp for a 25-sec. start and 1200 hp for a 5-sec. start. Much more a needed increase of starting power is required to reduce the starting cycle from 30 to 5 sec.

► **Interceptor Engines**—It is seen that high thrust engines will be required for engines which are to be started in a 3-sec. duration. Such high strength engine drives may in some instances lead to increased engine weight. However, when one considers the interceptor aircraft, for which seconds may be the difference between a successful and an unsuccessful interception mission, it may be argued that the time saved by the fast start is equivalent to a dramatic increase in engine thrust in terms of the length of time required to affect the interception.

The argument may be countered by questions concerning the length of time required for a pilot to secure himself in the aircraft and the length of time



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required to wire up several electrical or electronic equipment.

A further reason for considering these starts is that a very short duration starting cycle is required of a cartridge starter in use.

► **Starter-Generator**—Our aircraft presently in service are started using either electrical starters or starter-generators. The latter is a very advantage-out from the point of view that the starter will serve as a generator while the aircraft is in flight. Thus, most of the weight of the motor may be changed to the generator duty. But reliability of a generator intended in the status of starting means doubtful.

► **Ground-Supported System**—There are two basic types of starter systems: ground-supported and self-contained. In the former, the prime mover remains on the ground. In the latter, the fuel and the device for converting the chemical energy of the fuel are contained in the aircraft.

A comparison of ground-supported electrical and air starter systems shows that a 15-hp electrical starter is rated at 16 hp. A 17-hp air starter is rated at 15 hp. The air starter will provide a better acceleration for the turbojet engine with a weight saving of 44 lb per engine. In addition, large weight savings in ground equipment can be anticipated.

The generating set for the 16-hp electrical starter weighs 1,000 lb. The gas turbine which provides the air for the 15-hp air starter weighs only 55 lb. As a starter with fuel cells and accessories, it is expected to provide a transportable ground power source which will weigh no more than 600 lb.

► **Air Starter Adaptability**—The air starter is readily adaptable as a self-contained starter system. It is light in weight and it will use the aircraft's fuel. The 16-hp electrical system may be made to approach weight self-contained by using a 190-lb battery. One such battery will provide sufficient energy to crank the 16-hp starter for a total of approximately 100 sec, but this performance cannot be obtained when the battery is not fully charged. And not when operating at very low temperatures.

Recently because of weight considerations, development endeavor has passed from electrical starters to other types.

► **One Opinion**—Dewar states that in a similar report on the starting of aircraft equipped with ground-powered electrical starters, the maintenance officer of an intruder base gave the comment on ground-supported systems: "Even if the proper amount of power plants mounting equipment, vehicles and devices were available, the cost of equipment and the expenditure of man-hours for starting a large number of aircraft

in a short time is beyond a doubt excessive."

Dewar concludes that tactical considerations will require that interceptors and some other types of military aircraft be equipped with self-contained starter systems.

- **Factors Affecting Choice**—He goes on to say that three factors requiring consideration in the choice of starter system have been presented themselves:
 - Weight
 - Suitability for operations under extreme conditions
 - Reliability as a completely automatic system
- Other factors which must be considered are:
- Bulk
 - Number of starts which may be made without recharging
 - Cost, maintenance, storage handling and supply problems involved if a special fuel is needed
 - Vulnerability to enemy attack
 - Adaptability to many types of aircraft

Several starter systems can be designed which will be advantageous when considered in respect to several of the above factors. No one starter system which is optimum in all respects has been known yet. Dewar holds: For emergency situation, development effort can be expected to be concentrated on a few types.

► **An Opinion**—With the air starter, the oxygen rate supplying the air is a gas turbine very similar to a turbojet engine. Instead of supplying available energy as a propellant jet, this gas turbine supplies it as compressed air. The available energy of the compressed air is extracted by the starter's high speed turbine wheel. The reduction gear reduces the speed to a suitable cranking speed for the engine.

A speed sensing device opens the air to the starter to be shut off when maximum cranking speed has been reached. The clutch is an automatic engaging and disengaging mechanism, engaged because the starter turbine is designed to reach its peak allowable speed when the turbojet probably is at 20 to 35 percent of its operating speed.

► **Portable Starter**—Is a hydrogen peroxide turbine starter, the hydrogen peroxide is fed by a pump in a catalytic chamber operated at 300 psi. The catalyst decomposes the peroxide into steam and oxygen at approximately 1,500 F. These products are very desirable working fluids for a turbine. The lower elements of the starter will be similar to those in the air starter.

Development of the hydrogen peroxide starter is not being pursued because the peroxide is a special fuel item presenting problems in procurement, storage and handling, and a 90 percent concentration which would be used in

10 times

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craft has to be flown all the time and has inherent instability, 30 to 40 minutes of hooded flight is pretty tame. This can be partially licked if the student learns how to use his elbows on his knees and does not continuously move the throttle during straight and level flight.

• **False ideas and habits in radio range signals.** These were believed fatal to the location of the antenna on the test aircraft.

During detection of the second class in helicopter instrument flight, the basic program was examined critically for any shortcomings. All the instructors agreed that the program was satisfactory with one exception. It was recommended that the range orientation phase be allotted a minimum of two hours, and that additional time be given consistent with the student's proficiency and the availability of the aircraft.

► **Altitude Changes.** A number of changes were made in the February 1956 in order to improve the training program. These changes were relatively minor, and included such items as the installation of a warning pump on the hydraulic boost bucket, and the replacement of electrical gyros by vacuum-type instruments.

In addition, VHF equipment has been installed for pilot convenience and for CCA training when facilities become available. The volume control for the radio range receiver has been relocated on the left side of the cockpit to eliminate the old practice wherein the pilot had to use his right hand for volume control and left hand for manual control of the receiver.

The radio antenna has also been moved from its position along the right side of the tail boom to a location under the fuselage. This was done because it was observed that the false beards and hies occurred on the 18-30 and not on the later 18-35 models, which apparently have an antenna which has been relocated.

Two new engines were also developed to replace the standard instrument gauges. One of these engines is a blue transparent shield which acts as a padded absorbent hood and can be raised at will for contact flight.

The other is a standard pilot's gun glass with blue glass installed and provided with blue blinders. But this device is not preferred by the student because of discomfort and inconvenience in hooded autostrutings. When the student is told that he has "broken out" he must ease the engine quickly. The modified gun glasses do not run up and the nose section pans accordingly.

The shield is preferred and is more practical except when direct sunlight strikes on its inside, giving a blinding reflection in the pilot's eyes.

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This book on PUNCHING CARD ACCOUNTING outlines a method for better inventory control, shows how quality machines can give you reports on the money being sent off for production control. Punched-card produce at least cost all these reports, engineering bills of material, scheduling, materials control, progress control.



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Above: Stretch-forming and twisting around a compound curve in a multiplicity of planes.



Showing finished stretch-forming after shaping and heat treating of flaring. Pull in either direction is assisted by both rolls and take cylinders.



Stretching the largest stretching pressure on a light vertical air flaring. Some machines will handle from 1,000-lb. to 100,000-lb. pull.

The BATH machine provides the 14 essentials of a **UNIVERSAL** Contour Former. It is the only machine that can form virtually all the shapes that will be required in future aircraft design.

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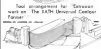


Aluminum gas turbine rings accurately formed to complete circle.



Large compound aluminum sheets accurately formed on the BATH machine.

TYPICAL DIE SET-UPS



Typical compression forming set-up.



Left: Photo illustrates how typical aerospace section is stretch-formed on the BATH Contour Former. Stretching rolls continuously permits forming sheets with great any combination of curves.



Stretching aluminum "Z" extrusion being formed in both horizontal and vertical curves.



Above: Illustrates compression forming of heavy wrought and forged steels.



Showing progress in stretch-forming of a 90-foot aluminum extrusion.



Showing how full circles and spirals are formed on the BATH machine.

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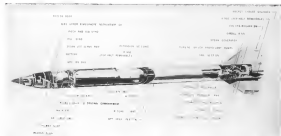
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Viking CUEWAY is first release of interior arrangement of Staten land, high-altitude aircraft carrier (Aviation Week, Jan. 15, 1951)

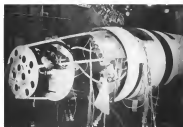


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EXHIBIT 15 ALCOA'S 15 years, most of Viking's electrical wiring. These fabrication metal attracts attention.

Inside the Navy Viking Test Rocket



STRENGTH of its outer skin, Viking uses various alloys used in its world of Naval Research Lab equipment.

EQUIPMENT

TWA Orders Collins Radio Units

\$500,000 purchase will outfit carrier's new planes and replace World War II communications equipment.

By Scott Reiniger

With almost \$500,000 in orders from a single airline, Collins Radio Co. is starting quantity production of improved VHF transmitters and receivers designed to replace World War II surplus models now being used by many airlines and executive plane owners.

The big customer is Trans World Airlines. It is the first to place with Collins what amounts to a purchase order for a complete line of VHF communications, 11.5 and 11.6 megacycle equipment lately developed by the radio firm. Other airlines have purchased in ordered lots in one or two of these categories, but not in all three, the company explains. It plans to begin delivery of the new equipment in March.

■ **Half Million Mark.**—Collins says it has received from TWA a first order amounting to \$185,000 for 51R-2 VHF communication line navigation receivers and \$100,000 for 17L-2 VHF communication transmitters. These, added to a \$45,000 order for 51R-3 glide slope receivers (Automatic Width Dev. II, p. 40) and one for semi bearing indication and selection amounting to \$55,000, plus others for controls, dynamometer power supply, checkmate, antenna frames, antennas, spurs and related equipment, add up to a lease approaching the half-million dollar mark.

Besides a desire to get rid of World War II surplus sets and shift with the latest in radio equipment, TWA's large order at this time obviously was spurred in part by the fact the airline is adding a large number of new planes to its fleet.

In contrast, American Airlines was the first carrier to purchase radio-produced 51R-1s (TWA's order is for 51R-2s), but has kept the remainder of its surplus equipment. AA agrees just out that the airline, unlike TWA, is not adding any large number of planes to its fleet—it recently completed an extensive and costly re-equipment program. They believe long-proven surplus sets can give good service for some time with proper service. To justify the increasing VHF communication need, they plan to modify their surplus VHF transmitters from the 10- to the 51 channel type, extending their continuous output two or three times. Glide slope receivers, however, may be

replaced within the next year or so as ■ **New Sets—Collins'** new sets, with the surplus equipment they replace.

■ **Model 17L-2 VHF transmitter** (180 channels)—replaces transmission section of World War II AN/ARC-1 transceiver (10 to 50 or more channels with modification).

■ **Model 51R-2 VHF communication/navigation receiver** (240 channels)—replaces receiver section of AN/ARC-1 transceiver, RC 7710 location receiver (six channels), and removes need for separate emergency receiver.

■ **Model 51V-1 glide slope receiver** (20 channels)—replaces 350H/ARN FA receiver (1 to 18 channels with modification).

With an eye to giving airlines radio equipment that will not quickly become obsolete, Collins has built into its sets the full range of VHF facilities set aside by the Federal Communications Commission for present and foreseeable future use by civil aircraft.

To provide maximum operating ease, versatility, and savings in space and weight at minimum initial cost to airlines, the 17L-2 VHF communication transmitter has been designed for compact dual-mounting and closely integrated operation with the 51R-2 VHF communication/navigation receiver. Two 51R-2s actually would be used in a single plane, one simply for communication, the other for navigation.

■ **Advantages.**—There are some of the advantages put forth by Collins for its equipment:

■ **A single type receiver** provides all VHF communication receiving, control and ILS functions, except for glide slope, simplifying maintenance, up-keep and standardization problems.

■ **Channels on all channels** allotted in the VHF communication and navigation frequency bands—compared to only a limited number of channels available in old sets.

■ **High power output** conservatively rated by Collins at eight watts as better than a 15-watt input Collins sets surplus equipment when rated as five to eight watts actually has an output around four watts.

■ **Greater communication flexibility**, permitting both duplex (two-way) and simplex (one-way) modes on the same



17L-2 VHF transmitter with 180 channels



51R-2 VHF receiver with 240 channels



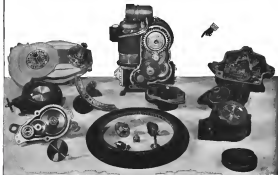
51403 frequency selector control

frequency) operation, or simplex only. Surplus AN/ARC-1 transmitters permit only simplex operation.

■ **17L-2 Transmitter.**—Specifically, the transmitter provides a total of 180 channels spaced in a 100 Mc. separation band on the VHF communication frequency band between 115 and 135.5 megacycles.

This is achieved with only 15 crystals, split into two banks, one bank containing 16 crystals and the other containing 16. Simply explained, crystals in the first bank are spaced one megacycle apart from 90 to 107 Mc., while those in the second bank of 16 are spaced 100 Mc. apart from 26.9 to (Continued on page 38)

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36 HARTMAN RELAYS PROTECT BOEING'S B-47 BOMBER



J&H GC-18 18-tube Control Panel.
Photo Courtesy Jack & Heaton
Precision Industries, Inc.

Mindful of the lightweight efficiency and trouble-free performance of Hartman reverse-current cutouts and other d-c devices in military and civil aircraft, Jack & Heaton added to Hartman to supply vital

relays for the J&H GC-18 control panel installed in the Scooper.

Each of the aircraft's six generators is protected and regulated by an individual GC-18 control panel equipped with five Hartman relays:

- (1) **Differential Voltage and Reverse-Current Relay.**—Circuitry protected to bar when generator voltage exceeds battery voltage, disconnects generator from bus upon reversal of current.
- (2) **Ground Fault Relay.**—Senses ground faults when both strands on a cable, cable de-energized generator.
- (3) **Overvoltage Selector Relay.**—Senses load current to detect generator producing overvoltage and automatically sets an overvoltage relay to stop at lower voltage than other relay stops.
- (4) **Boost/Limit Relay.**—Disconnects regulator supplying current from regulator but to avoid pulling system voltage down when generator is responsive.
- (5) **Overvoltage Relay.**—Senses overvoltage and can cut generator Relay bar reverse limit characteristic to prevent excessive trips.
- (6) **Counter and Dropout Relay (Not Allowed).**—Installed in fuselage near main bus, one of three counter units, each controlled by a GC-18 panel, counts and disconnects generators from bus during lock arming and groundings conditions.

Typical of Hartman design and manufacture, relays in the B-47 are just a few of the many d-c devices required for the aircraft industry. Whenever your problem involves d-c controls, turn it over to Hartman

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A-100

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289mc. A crystal in the first bank and one in the second bank are mutually selected and the separate frequencies they determine added together to obtain the desired frequency in the regular 118 to 135.9 MHz communication band.

The two frequencies are added in a balanced modulator, giving a signal of the desired output frequency which is amplified by a buffer amplifier and power amplifier. Crystals are selected by remotely controlled Autophasehouse units. The unit selecting the autophasehouse determining crystal also operates the mechanism which turns the amplifier, master and power amplifier circuits. Fast-break, faultless circuits operate with the truth autophasehouse crystal. Remote control is accomplished through a positive case-wire system.

Control Methods.—Through output frequency-selective routing directly in autophasehouse, several methods of control can be utilized. They are:

- Single frequency selective control of both transmitter and receiver for simplex operation (send and receive on same frequency).
- Dual selector control of transmitter and receiver, permitting either simplex or duplex operation (crossband).
- Control from two frequency selectors with a transfer switch permitting either just as separate frequency selection.

An antenna changeover relay is included in the transmitter for switching the VHF antenna between the transmitter and its companion receiver. For communication only, the receiver high voltage plate power may be obtained from the transmitter oscillator.

Basic test specifications for the 17L-17L-2 unit modulation fidelity with a 1 db. from 200 to 6000 cps, distortion at 1000 cps, 90 percent modulation is less than 10 percent. Slewability—0.007 percent with frequency ranged from 0 to 15 percent, temperature limits—55 to 72 C, supply voltage variations of ± 10 percent. Power requirements—autonomy (transmitter only), 1.0 amp at 26.5v dc, or 10 amps at 13.5v dc, transmitting, 2.8 amp at 26.5v dc, or 15 amp at 13.5v.

Collins says 50 pre-production 17L-2 transmitters already have been sold to companion aircraft users, among them, Trans.

• **51R-2 Receiver.**—The 51R-2 set is designed to meet navigation and communication receiving requirements of all types of military, commercial and private aircraft using the 106 to 135mc band. Only 16 crystals are used in the set to provide operation on 250 channels spaced at 100kc intervals. To approximate this, originally a total of only 16 channels originally were available in the parallel AN/ARC-1 transceiver and AC-711-13 localizer receiver unit. New 51R-2 replaces both these functions.

series in ARC-1) and add countermeasures. The receiver may be set up for operation on a 200kc basis simply by cutting 10 crystals.

The 51R-2 is a double conversion superheterodyne having a tunable first i-f amplifier while the second i-f amplifier operates at a fixed frequency. The set provides these features:

- Voice communication in localizer and countermeasures as well as on all regular VHF communication channels.
- Tone and phase lockouts, including flag closure.
- Automatic countermeasures indication through voice differential, giving non-break ADF and magnetic compass position on radio magnetic indicator.
- Countermeasures indication on countermeasures meter, control chosen by manual bearing selector. Includes operation of "in-flight" indicator and flag alarm.

Shared selector circuits in the receiver are arranged to permit addition of a glide slope receiver to the system. Simultaneous parallel operation of receivers on a common frequency-complexation antenna, such as Collins ST-1, selected by TWA, can be accomplished without interference, the radio first step. Full flag down indication on countermeasures signals occurs with less than 5 microvolts i-f input. And stable countermeasures indication is obtainable down at less than three microvolts i-f input. Collins engineers say.

Other receiver specifications are: Stability 0.007 percent under all service conditions. Attenuation of undesired frequencies—image rejection ratio, 75 db, image, including antenna, 100 db, adjacent channel, 75 db, all other undesired frequencies, 50 db. Accuracy of adjusting means—manual operation, indicated bearing error, ± 1 degree; ± 1 deg of the wave bearing, automatic operation, indicated accuracy of ± 1.5 deg is maintained. Audio output—single channel, 500 milliwatts in a 500-ohm circuit. Power supply—operates on either 14 or 28v dc with variable external differential power unit 5 amp, required at 25v dc or 11 amp at 14v dc.

• **51V-1 Glide Slope—Cueing.**—Collins' versatile four set combination, the 51V-1 is designed to provide higher stability, accuracy and sensitivity than surplus B-93B receiver it replaces. It receives 500/1500 mc modulated signals on any of 20 channels in the ultra-high frequency range of 120 to 135mc, compared to only three channels originally available in old sets.

Set up for 10 channel operation and fitted with ground cable, the 51V-1 can be mounted in the same dashboard supporting the surplus B-93B it replaces. An auxiliary connection plug (passive) and identical crystals complete its interchangeability with modified B-93B channel B-93B.



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NEW AVIATION PRODUCTS



Canopy Air Motor

The number and diversity of pneumatic transducers placed in the new transport cockpit has increased steadily in the past few months.

Now the Romeo division of Lear, Inc., announces development of a pneumatic motor, Model AIA-24MA, for use as an emergency canopy actuator in fighter planes. This unit can be operated to open the canopy when the regular electrical actuator fails.

Romeo says the new device is highly adaptable to many aircraft applications requiring rotary motion. It is rated for 1000 psi air pressure and operates at either direction. A gear type of 8,100 in. in displacement, the motor has a high starting torque which is positively proportional to input pressure, according to the company. Motors are tested for a running torque of 25 in. lb. under conditions of loaded energy taken from a 15 cu. in. tank, pressurized with even pressure at 1000 psi. Speed is varied by controlling air flow to motor.

The unit weighs only 1.5 lb. and is designed with a maximum of parts. Only parts that were not two angled gears which can on needle bearings. The drive shaft has splined couplings, plus no shaft seal at packing. Escape ports vent air leakage away from the shaft. The remaining design on the motor is designed to accommodate an adapter for special installations. Address: Romeo Division of Lear, Inc., Elms, Ohio.

Rugged Plastic

Development of a thermoplastic sheet material for use in aircraft has been announced by United States Rubber Co.

Called "Rynite" the material is "extremely" tough and will not support combustion, according to the company. It is considered perfect for engine

in places, for use on instrument panels, radio cases, covers for protecting instruments, special window frames and other applications.

Besides being tough and flame-resistant, the firm's engineers say it is highly resistant to impact and is light as weight. Other desirable features of the product, cited by the company are "isocyanate" chemical resisting qualities, its low rate of heat conductivity and water absorption and its capacity to resist stable under changing atmospheric conditions and severe climates.

It's easy to form "Rynite" into any pie or compound shapes, says the rubber company, which adds that it will not creep or creep, is easy to clean and is not affected by stress, grease and oil. The material is available in several, standard flat sheet sizes, in five standard colors and five grades. Address: Rubber-Dur Canada, New York 20, N. Y.



Bomber Actuator

A rotary actuator, especially designed for use in the automatic pilot system of a long-range bomber, is being marketed by Electrical Engineering and Mfg. Corp.

The new unit was developed in cooperation with leading aircraft design groups and conforms to Specification ANM-46, according to REMCO. It has a duty cycle of full load for one second, one second off, then full load one second continuously.

High temperature materials are used throughout and the motor, rated at 14 hp. at 9000 rpm, construction, is completely wound in silicone. Case temperature is 310 C. at rated duty cycle. The actuator is equipped with a magnetic clutch and brake, under name filter, manual overdrive and bypass loading device. Address: 4006 W. Jefferson Blvd., Los Angeles 16, Calif.

Drives Studs Safely

A collet type stud driver, designed to eliminate installation and removal of stud threads and destruction of costly holes, is being marketed by Titan Tool Co.

With this tool, according to the firm, damage is avoided through driving the stud by means of quick diameter pressure, rather than applying pressure on top of the stud. Designed for use both in factory and aircraft maintenance work, the AIA Series stud driver is available as a hand tool employing a "T" handle or as a power tool.

In its design, it represents a departure from regular methods of securing pressure on stud driver collets, Titan says. The firm explains that as reactive power is increased, the driving member, which has built-in pressure cut in a 4 in. stroke, moves upward as well as backward, releasing pressure on the collet and forcing the stud. Length of the collet grip on the stud can be adjusted and collets can be changed. Address: Titan Tool Co., Dept. E, Florence, Pa.

ALSO ON THE MARKET

Model 415 bearing machine will finish bore 1/4 to 4 in. in dia., has working stroke of 15 in. Machine carries three-speed belt-driven stud spindle, driven by 3 hp motor and has a 1-hp motor, driving a Vickers hydraulic pump for reciprocating speeds from 1 to 70 fpm. Made by C. Allen Palmer Co., Cincinnati, Ohio.

Warning signs, designed to caution lift truck operators at plants are available in safety kit from Townmaster. Brightly colored signs can be placed at strategic points in plant to warn truck operators of blind corners, traffic crossings, low head room, etc. Safety manual also included in kit. Available from Townmaster Corp., Cleveland, Ohio.

Improved adaptable collar for milling machine cutting wheels gives high accuracy spacing with simple operation of loosening collar about shaft, the plus or minus adjustment being made with special square wrench furnished. Made in Dayton: Roger Mfg. Co., Minneapolis, Minn.

"Band-D-Wipe" is plastic device for finger controls that can be used by machine operators to remove efficiently and quickly excess oil and grease from hands as they work. Attached to bench or wall, unit has well to catch oil. It's made by Reliance Machine Works, 242 Eagle St., Brooklyn, N. Y.

Improved wet-grinding wheel refers will remove sand all surfaces in 10 to 30 days, handles stress from 4 to 50 in. and has valve load capacity up to 4 in. in diameter. Plunge grinding is eliminated and no "nick" attachments are needed, says maker. Mink & Decker Mfg. Co., Toms River 4, N.J.

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FINANCIAL

Copter Shares Lure Speculators

Increased military interest and possibilities of growth push stock prices above immediate earning potentials.

Emerging in a cycle of its own, a helicopter boom is breaking out all over, completely outdistancing the rapidly expanding pace of the conventional aircraft industry.

Spurred by effective analysis of helicopter in the Korean war, an increased interest has suddenly developed in the manufacturers of the rotor craft.

Much of the trail and roar work that accompanies new engineering developments in its rapid stages appears to have been completed in the helicopter sector along in its technological progress. Sufficient experience has been accumulated to warrant substantial military orders for this newest type of aircraft.

This is seen in accumulated large-scale expansion by helicopter builders now in active production and has reinforced new hope in the group having prototypes in various stages of development but no sales.

► **Pasco Boom**—Substantial expansion has been undertaken by Pasco Helicopter Corp. As of the 1949 year-end, this company's backlog, including letters of intent, aggregated some \$312 million, as more than double the amount of the previous year. The present backlog is estimated in excess of \$70 million. Despite increasing its own plant facilities at Morton, Pa., to permit greater expansion, Pasco is subcontracting about 75 percent of its current business.

This sharp increase in backlog, in spite with the prospect for the future, has found a quick reflection in the market fluctuation of the company's common stock. Very few aircraft equities of any kind are equal the almost speculative price appreciation experienced by the Pasco stock in its short time.

Increasingly prior to Korea these shares were quoted around \$5.50 per share. In a series of jumps, this stock recently reached a level where a bid of \$40 per share appeared.

This fast run-up, while set in motion by the growth prospects of a new development, was accentuated by the nature of the company's capitalization.

These are 1,925,000 shares of common stock outstanding, with management interests known to own more than one-half of the total.

This leaves a very limited supply

available for public investment. And any demand is bound to have a most positive effect on market fluctuations. This tends to establish price completely devoid of near-term earning possibilities or existing stock values.

Three other Low Cost For example, the price of \$40 per share implies a market valuation of the total Pasco equity at about \$55 million. On Dec. 31, 1949, the book value of this new equity was shown at less than \$1 million. For 1949, the company showed net earnings of \$107,948 or 76 cents a share. Results for 1950 are not known and difficult to estimate at this time but even if they reached \$150,000 for less than a year, current market would establish a price ratio of more than 37 times current earnings.

The liberal nature of these market valuations is evident when contrasted with conservative prices of established aircraft companies. Douglas, for example, currently sells at a discount to its book value and is estimated to have a price ratio of only 12 times current earnings. Virtually all major aircraft equities, however, are at market appreciation, usually all below or near current book values. Further, even with earnings and prospects in the aircraft area, they command a price ratio over 10 times current earnings.

Many speculators, impressed by the growth prospects of the helicopter, and finding the Pasco shares even higher in the over-the-counter market, are an agent of the illusion that can occur in this equity trade. The conversion of existing notes. Last spring, a total of 5,000,000 five-year convertible notes were sold in new additional working capital for the company. These notes are convertible into common stock at the rate of \$12.50 per share for the first three years, \$15.00 a share the next year and at \$17.50 during the fifth year. It converted within the first three years, in agreement. With a total of 24,000 shares of additional common stock would be created, thus diluting the existing equity by about 20 percent.

This speculative market enthusiasm has spilled over into other companies identified with helicopter development.

► **Honey for Speculators**—For example, Dornier Helicopters, now working with Curtiss-Wright on a prototype but with

no military orders as yet, has faced sudden lull with speculation. Actual orders have been the price of its stock in the over-the-counter market to about \$5.50 per share.

For a long time, only minor speculation existed for this security. Further reflection of the market is found in speculative demand for the shares of the Gyrodine Corporation of Aachen. This company is working on an experimental rotorcraft which it hopes will prove sufficiently successful to win a military order.

The helicopter field is by no means the exclusive province of the specialty companies devoted to this product. Well established in this activity are a number of the old-line aircraft builders whose name presently, relatively, dwarf their helicopter projects.

Boeing Aircraft has long been a leading contender for helicopter business and recently secured a substantial income in orders for its three-place Model 40-type rotor (see page 10).

The Sikorsky Aircraft division of United Aircraft, the greatest builder of helicopters, has had a material increase in orders to meet the demand for its various models.

McDonnell Aircraft has appeared as a contender for more important helicopter business with its jet rotor, "Little Hawk."

It is probable that of these major aircraft builders were not engaged in their other activities, but once again with the helicopter, they would have to contend for greater speculation. Because of the very nature of their broader diversification of activity, which they wish for greater stability of operations and results. In fact, it was the savings generated from the sale of old equipment which made possible successful experimental excursions into the helicopter field by these manufacturers.

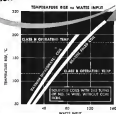
► **The Good and Bad**—There is little doubt that the helicopter has fired the speculative imagination. As with all new industries with almost growth possibilities, there is absolutely no relationship between production, market quotations and current market value and earnings. Market valuations at any given time represent a projection of changing future prospects. At these prospects come in direct proportion, market valuations are quick to adjust accordingly.

The correct speculative and investment interest in helicopters can prove constructive in that it does make possible additional sources of capital. At the same time, speculative excitement can be harmful in that investor enthusiasm may suffer at some future time when such financial assistance may be needed.

—Belle Altschul

44

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Circle 10 on Reader Service

DC-6 line, or a 24 percent reduction. New Record—This estimate appears conservative as was the prototype jetliner's unofficial record time for airline-type transports of 1 hr. 42 min. on a flight from Chicago's Meigs Field Airport to New York's LaGuardia Field, in Jan. 16, for a 746 mi. lower-to-lower runway distance.

Taken as is (61,631 lb., just under full gross weight (55,000 lb.), made up by carrying full baggage loads) officially stated, the long-range experimental results, supplemented by engineering flight test observed and various items of test equipment.

Best time for a piston-powered transport, an American Airlines DC-6 in its inaugural Chicago-New York run on April 27, 1947, is reported to be 1 hr. 51 min. 45 sec., with about an 80-mph. tailwind. Average speed was 345.55 mph. The plane was not fully loaded on that flight.

• Tailwind Help—Tailwind on the Jetliner flight was approximately 70 mph at the western end of the run. Average tailwind was reported to be about 53 mph. Measurement ground speed with the Chicago tailwind was 520 mph.

This Jetliner trip, a regular engineering development run to gather data on speed, high-altitude cruising and fuel consumption, brought the total flight time for the plane to 176 hr. That time slot has been occupied by a new crew consisting of pilot Donald H. Rogers, co-pilot Michael George-Sloper and flight engineer Albert Miller.

• Fuel Burn—After about 223 mi. out of Chicago, the plane was at 35,000 ft. and around at that altitude to Allentown, Pa., where it began its 125-mi. tailwind into LaGuardia.

An index per pound of fuel at cruising conditions was estimated at .067. That is not the best figure for the Jetliner, and on that particular run, speed characteristics were the prime consideration.

Fuel consumed was about 1750 gal.—about 12,000 lb. • Toronto-Winnipeg—Flight—Just as important as its Chicago-New York run, the Jetliner flew 595 runway miles, Toronto-Winnipeg, on 2 hr. 40 min., on Jan. 12. At the outset, the prototype had to back a headwind of about 100 mph., which tapered down and changed to a slight tailwind by the end of the flight. The trip was made at 35,000 ft. The return trip was at 33,000 ft. and took 2 hr. 39 min. 50 sec. tailwind at Winnipeg to arrive over the Toronto tower. Fuel consumption was 2260 gal. and used 2193 gal. for return.

Fuel capacity (usable) of the prototype is about 2530 gal. The production version is expected to have a wing capacity of about 4000 gal. Second prototype Jetliner should be rolled out for flight late this summer.

Airline Strikes Averted by MRA

A wave of airline executive and pilot concern to Mead Research Association is credited with averting at least two threatened airline pilot strikes already this winter.

United Air Lines President W. A. Patterson, National Airlines President C. T. Brainer, and Air Line Pilots Assn. representatives on the performers in the Mead Research Association move which is longwinded with labor management history.

Scott Patterson at the recent Mead Research Association "A 70 month deadline was broken by the application of the principles of moral commitment—absolute honesty, purity, simplicity and love—to its problems." He said 119 problems were cut down to 11 problems, eight of which were settled in 5 days. Patterson added that he felt based on MRA from a pilot he had considered one of the most difficult men in his airline. "He refused to let any other and apologized. I was speechless."

The pilot, Larry Simpson, handles grievances for the UAL Pilots Assn. To the MRA concerns Simpson confessed that he had been "an expert in denouncing management." But after consultation to MRA he "went to the executives personally and told them I had failed to bring a good officer."

An Air Line Pilots Assn. announced in the recent MRA convention. "Through MRA the pending strike of NAL pilots has been averted." The pilots had voted last month to strike in June after 12 grievances. UAL President Brainer, for NAL direction and three ALPA representatives attended the MRA session.

Washington Airport Services Revised

Washington, National Airport has shaken up its fast connections, land connections and land lines.

GAO (G) has brought back an exclusive fuel connection. CAA paid \$375,000 for GAO's distribution and storage system, which it leased to Allied Aviation Fueling Inc. Allied is running the system on a cost-plus basis. At the end of ten years the whole system will belong to the airport.

Airline is able to make fast contact with any company, even, as that case may be, several oil companies serving the airlines on the one side.

Higher airport landing fees are sure to make up for the fast GAO GAO used to pay the airport. But GAO's fees were reduced in the event of higher gas prices to the airlines, as there may be a price in fuel cost.

The airport has also managed its food concessions. In-flight meal service and waste ground service have been contracted to Hiet Stages, Inc., which formerly almost all food concessions at the airport were operated by Air Terminal Services.

Average landing fees are about \$120 for DC-3s, \$50 for C-47s, \$50 for DC-4s, \$70 for DC-6s and Constellation, \$50 for DC-7s.

SHORTLINES

• Air Express—Additional direct air express service has been set up between U.S. and Canada and 31 Mexican cities via Aero Transportes. Shipments must carry three copies of commercial invoice, four of shipper's export declaration and a shipper's letter of exportation. Shipments should be addressed c/o ASTA Airlines, Bloomfield, Tex.

• Alaska Airlines—Company expects to close a 1958 winter schedule without the usual seasonal loss. November-December gross revenue of \$528,130 is three times that of a year ago. Alaska's DC-4s have been on the Tokyo route since July 5, 1958. C-46s are

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EDITORIAL

A CAPABLE MAN, BURIED—Russell Adams' removal from his important membership on the Civil Aeronautics Board is still one more cruel result of Washington politics. The Board needs his experience and his capabilities. Instead, the President not only fails to reappoint him at the end of his term, but relegates him to a State Department office that specializes in the complexities of anti-lateral treaties. One wonders whether even this third-rate appointment might have been forthcoming if Mr. Adams had not earned the loyalty and respect of some important persons on Capitol Hill. We deplore the manner in which Russell Adams, a talented and conscientious public servant, has been tossed aside, and the purely political maneuver prompting the action.

MR. FINLETTER AS A STATESMAN—We commend the Secretary of the Air Force, Thomas K. Finletter, for his intelligence, understanding and skill in smoothing out some of the rough edges that had developed in the opening stages of the Keeser-Fairchild-Air Force negotiations. Fairchild's president—Richard Beutelle—like so many leaders brings in a very reasonable individual when approached in something less than a dictatorial let's knock the heads-together attitude. This Secretary Finletter fully realized when released of the early meetings between Fairchild and other USAF people.

IF KOREA BLOWS OVER—We heard this phrase as recently as last week from a high officer in one of the military services in Washington. It's a shocking experience to encounter in an important defense office in the one U. S. city where most of us hope there is fullest recognition and understanding of the danger the free world is in. And where you want to think the most vital meetings are being held day and night to plot the most intelligent way out of our mess. Instead you hear, "If Korea blows over, we might find ourselves out on a limb with an unnecessary defense machine."

Unfortunately, this attitude appears ripe to be typical of some of our government leaders. How many, we don't know. But we do know that is the prying, inquiring gossamer vulture, Washington certainly does not reflect the state of emergency we read about in the newspaper headlines.

As one of our most thoughtful aircraft presidents told us the other day, our economy is still gray, and the aircraft industry (and any other defense industry) cannot

possibly meet the petterations gush the President has set as long (for example) as machine tool makers are swamped with preparations for new models of automobile engines. A defense official a few days later told us privately that the objectives of his job are actually hopeless of accomplishment as long as we continue to try superimposing a war economy on a full peacetime machine.

WITHHOLDING FACTS FROM THE PUBLIC will become a major issue within the coming year, we fear. Keeser observers in the Capitol note telltale signs of an increasing tendency by government officials to dry up information channels, discourage individual press initiative in covering the news, refuse to answer press queries. The most sinister beginnings are becoming apparent at the top levels of government. There is nothing much in the way of official orders yet. Public information officials themselves are still doing a creditable job in answering queries and releasing information, but several don't expect this condition to last long.

Constant censorship in the battle areas is frequently necessary, of course. But every new generation of the military seems bound to learn the hard way that even battle information cannot be bottled up forever. And that the longer fact-observation builds up, the bigger are the banner rumors and the ultimate explosion.

There are indications back on the home front that every vestige of information relating to aviation production and orders placed with industry may eventually come under the Administration's verboten stamp if Congress and the press do not take some initiative soon to stem the tide. Nor is this too unrealistic likely to halt only aviation activities. All other weapons information faces the same blanket. Force weapons and great war developments it is only a few short steps to political censorship as well.

No one is eager to head the Russian chatter information on a platter. But in a democracy we have always drawn a line somewhere at a point where we decide some information is so important to the citizens of the United States as it is to a potential or active enemy. This is a check on government.

The public, the press and Congress should be alerted at once to this developing tendency in Washington. It is all very well to hold the most vital facts from the enemy, but failure to turn the light of publicity on bureaucratic mazes might also be detrimental in helping reach the enemy.

Robert H. Wood



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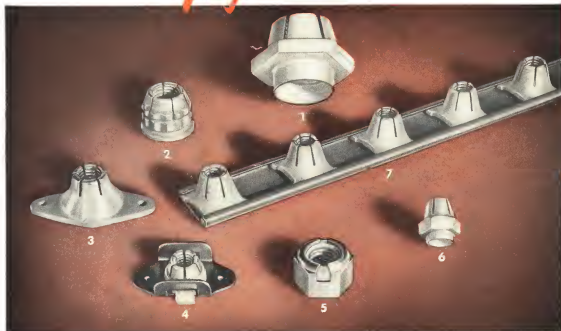
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1 Shank nut (1755) for blind applications subject to 1200° F temperatures. Metal shank extending below nut body is swaged over flange sections. Beveled edge allows part to fit close to filleted corner and prevents turning. Used extensively on inaccessible compressor wheel disc assemblies and in nozzle diaphragm assemblies.

2 Silver-plated 1200° F high-tensile, double-hex nut (1747) accommodates a socket wrench and reflects current engine design trends for extra wrenching surface. These features permit greater pre-stress and applied loads with minimum flange widths . . . suitable for use on turbine and tailcone compressor flanges.

3 This 2-Ing, 100° counter-sunk anchor nut (70ZA38) provides for flush external surfaces in blind mounted applications—can be riveted or welded in place. For 550° F temperatures.

4 Floating basket nut (Type ZA21 and ZA21-1200) spot welded in "blind" locations allows speedy alignment of nut over bolt hole. Available for 550° and 1200° applications.

5 Free-spinning two piece hex nut (1875) for temperatures up to 1200° F. Designed for applications like exhaust port stacks where studs and bolts are located in positions difficult to torque and for fastening parts and accessories where replacement time is critical. ESNA 1875 can be spun freely into position and locks securely when stressed. Silver plating prevents bolt thread galling and when contact with the work is broken, the nut may be spun off the bolt or stud.

6 Standard silver plated 1200° high-temp clinch nut (ZC2-1200) with knurled shank for permanent installation in blind locations.

7 Gang channel (straight or radius) for riveting into blind or partially inaccessible locations near inner combustion chamber, liners and nozzles. Floating nuts permit wide alignment tolerances—speed up assembly. Silver-plated for 1200° operations.

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